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ABSTRACT

For the forseeable future, universities will be obliged to become publishers for non-print media, since the markets for such products, where visible, are small and fragmented, and too risky for commercial enterpreneurship. Thus, for much the same reason as they created their own university presses and broadcast and graphic services, universities will integrate these capabilities with instructional faculties and staff and create, distribute and consume their own instructional non-print programing. Moreover, since production costs are high, institutional sharing is in order, and is happening. The first act of the university as videopublisher is to get its instructional house in order, to integrate its instructional resources, and use them effectively for its own purposes. The second act is to find partners for an enterprise which inevitably will be long-term and expensive. The third is to identify useful collaborators in the non-university world such as industry and the military. Finally, if higher education can produce video programing of merit for this evolutionary period, universities will gain additional markets; cable television will gain a new product, and the burden of being publisher of last resort may prove to have been a blessing for all concerned. (WCM)

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The University as Videopublisher of Last Resort

by C. G. Bowen

We have spent the past two days discussing interconnections between post-secondary education, a vast and traditional enterprise, and cable television a small, non-traditional industry that may be (if it survives) a useful ally. The contrast between these two enterprises in style, substance, and purpose is so great as to tax the imagination like the marriage of Arthur Miller to Marilyn Monroe: we approved in principle, but wondered what they possibly could say to each other. In a sense, the two days have been well spent, for we have learned that both enterprises are profoundly troubled; higher education finds it traditional strengths costly to sustain, and harder to market; cable television finds itself the most politically whipsawed new industry since atomic energy and its broader uses slow to develop. More concisely, if oversimplified, post-secondary education needs new markets; cable television needs new products: Two industries, contrasts in piety and impudence, length and brevity of history, ostensibly having served such divergent masters as high public purpose and private greed, hope that each may serve the other in a manner critical to the future survival of both.

Rhetorically, this glib analysis is fine, but *much too coarse-grained* for serious effect. Both cable and higher education will survive and more than likely do so by going their own and separate ways. Cable television can offer but marginal benefit to an enterprise which has yet to discover the

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uses of instructional broadcast at present, the potential impact of, say, the telephone being introduced to a monastic order avowing silence. And with entertainment programming as the sole product of cable television it will be enterprising indeed for higher education to persuade the telecommunications community at large (industry, regulators, consumers), much less cable television system operators, that instruction, not entertainment, is the message of the future.

Nonetheless, we are here to try out our holds on each other, as cableers, or instructional educational managers, as speculators in future services development. And, as such, we have talked principally about our respective distinct spheres and a little of our future *shared* realm. Not for nothing is the question of our new product, of what we jointly propose to make and sell, left till last. The only fundamental link between our largest national industry and our youngest communications technology is the instructional programming the former will create and consume and the latter may deliver.

My competence to address the subject of product is derived from a professional lifetime of university publishing, publishing primarily in print, more recently in film and video. More specifically, I *have been* tardy in abandoning a highly traditional and pervasive publisher's prejudice that there is little more to instruction than lecture and print and more help for learners in organization of substance and technique than in newer, better-equipped classrooms or lower student-teacher ratios. My Pauline conversion took place while directing Franklin Book Programs, a not-for-profit American organization for translating American books into noncommercial languages. While its president, I endeavored to direct the modest resources and considerable energies of Franklin in directions more clearly supportive of technical assistance in printing and publishing, particularly the improvement of instructional print. I also grew more concerned about the heavy constraints of our principal product. In most of the countries where Franklin worked, from Egypt to Indonesia, half the school age children during my lifetime would never have a school to attend, and the half that did would drop out by the fourth grade, leaving them functionally illiterate. Three quarters, then, of the school-age cohort of the third or poor world's population would be unable to learn with print as their sole mediator of learning. It was then that I, first, came to look at other means of mediating learning, media without the threshhold requirement of formal literacy.

After returning to M.I.T., I began to examine how little our own national post-secondary instruction was mediated by interpretations or interventions other than those of lecture, and of print. But of more interest I grew increasingly concerned about the substantive costs of use solely of traditional learning devices. It was as though recorded sight and sound had yet to be invented. In spite of Biological Sciences Curriculum

Services, biology was being taught as a written subject, with laboratories added; dynamic and kinetic processes were being documented by formula and described by chalk drawn freehand on the blackboard. The visual fraction of a subject matter was being constrained as effectively as if it were prohibited by law, and not only in science, but in the humane and behavioral inquiries as much as in physical life sciences. Illustrations in textbooks and slides safely reposing in their unique, custodial, and remote enclosures offered visual subject matter more fully mediated post-secondary learning.

My concern sharpened as I came to examine what happens sequentially to the rich God-granted visual processing tools for learning that are the birthright of our children, and are successively suppressed from the fourth grade on, to a point where post-secondary instruction as a matter of course, and possibly of pride, rules them out of order. My preparation for a few tasks at hand was now complete. The restoration of visual learning to the array of competencies utilized in post-secondary instruction became a cause as deserving as had been the creation of instructional print. From that point forward, this publisher could no longer conceive of "the things of learning"[1] in traditional terms. So a reexamination of those traditions as they applied to instructional stuff became a major research concern, and here today I am the fortunate man who finds a forum for so idiosyncratic a specialty.

THE TRADITIONAL THINGS OF LEARNING

Education has been religious in purpose far longer than it has been secular, and that legacy is important in instructional procedure, and in instructional mediation. The monastery and the cloister gave us campus-based instruction, not the moveable feasts of itinerant scholars and their students (the medieval open university, if you please) but fixed instructional plant, high walls, trees, and residences for scholars and students. The tutorial emerged directly from catechism; indeed the magic classroom size (30) emerges from Talmudic instruction, as Alvin Eurich has stated.[2] As it was with the campus, and with the lecture, so it was with instructional things. The substance of learning was recorded by the prevailing labor-intensive technology, and the scribes devoted lifetimes first to accurately copying the text and later to embellishing the page.

Perhaps the immediate ancestors of university publishers were these scribes attached to monasteries, charged with the obligation to preserve the precious libraries of handwritten books by making meticulous handwritten copies, often adding decoration and embellishment. The copying of text was done with great care, exhaustively proofread (for errors might involve heresy), then given headings and title pages of suitable graphic grandeur, and, finally, bound. The glorious era of handwritten

manuscripts and bound books was a massive step forward from previous devices for preserving thought and carrying it over distances in time and space; and the orderly procedures of proofreading and editorial care which were then followed continue to this day to preserve a text from one time and place to another.

The first textbooks – that is to say, those works studied or consulted in the process of instruction for whatever purpose – were copied books; they correspond to the modes of encoding then prevalent, but were not widely used. They were costly, cumbersome, perishable, and for all these reasons, access to them was highly restricted. It was the lawyers, who consulted text far more than the churchmen, who for reasons of convenience first changed the structure of written compilations from the roll to the book as we know it, with pages bound along one edge.

If the scribes were the scholarly publishers of their day, the antecedents of the publishers of textbooks may be found in the university students of former times who sought to provide their own low-priced copies of the classics. The historic role of the teacher in an early university was to read aloud from the classics at dictation speeds to gatherings of students. Rashdall, the great historian of medieval universities, suggests that the lecture then came to be divided into two parts: first, the reading of the text so that students could copy it, and second, selections of the most significant passeges within the text and commentary upon them. Later Odofredus, lecturing (the word dervies from the Latin, *legere*, to read) at Bologna in the early thirteenth century, augmented the dictated text as follows: "First, I shall give you summaries of each topic before I proceed to the text; secondly, I shall give you as clear and explicit a statement as I can of the purport of each Law; thirdly, I shall read the text with a view to correcting it; fourthly, I shall briefly repeat the contents of the Law and any distinctions or subtle and useful problems arising out of the Law with their solutions.[3]

Students, as enterprising then as now, quickly came to make arrangements with stationers who for a fee copied lecture transcriptions, or booksellers who rented out copies of full sets of transcriptions for the year. So much for the Italian line of descent for our textbook publishing. The other great university of that time, Paris, ". . . had its own statute on lecturing. Here the intention is to prevent the student from taking full notes – to prevent the publication and distribution of the masters' property. A later statute indicates the reaction of the students [to this early application of the principles of copyright]: 'scolars who throw stones at masters who speak too rapidly are to be fined.' "[4] The genealogy of textbook publishing thus had a proper combination of Italian enterpreneurship and French concern for proprietorship; it remains only to observe that so little changes with time.

As I have noted, education has been religious far longer than it has

been secular. To the educational monopoly of the early Church, the monastic schools, that secular substance came first in the Norse sagas, the *Song of Roland*, and the *Nibelungenlied*; and finally into this cleft marched the whole of the classical past – Greek philosophy, Roman law. The medieval university, a scholastic institution embracing both the Christian and the classic past, was born. Its masters and students, bound by religious observation and practice, lived communally. It was poor, but portable; and although relatively free from constraining forces of the church, the state, or the local populace, such fragile institutions were given sanction by both pope and emperor, which meant that a degree from any one institution was acceptable throughout Western Europe. Teachers, students, and indeed, whole institutions, could move at will from place to place. The substance of the programs of these universities is of less concern to us than their teaching methodology, and, most pertinent, their use of instructional materials. For all faculties – theology, law, medicine, and philosophy –

> . . .The method was the same. In theology it consisted in acquiring the summa, the total body of the logical knowledge gradually worked out in the system of the theological doctors. In medicine, it was the learning of the medical body of knowledge laid down in the system of the Hippocratic-Galenic tradition. In jurisprudence, the student learned the body of the Roman and Church law. And in the philosophical faculty there was a regular body of Aristotelian and mathematical knowledge which was considered authoritative. In a word it was the textbook method. The books were meticulously divided into puncta (periods?), and professors were fined at Bologna if they did not reach the proper points at the proper time.[5]

Thus, working through a subject, relieved regularly by discussion, and after rigorous examination (the baccalaureate examination at Paris lasted some televe hours, through which the candidate remained standing), a student moved to his successive degrees. Specialities developed; one went to Salerno for medicine, Bologna for law, Paris for theology. But the full flowering of instructional use of the conserved word awaited the invention, or at least the application, of the new technology of movable type.

An historical view of the evolution of the textbook illumines the universe of other instructional things. From the beginning, the textbook offered substance, that body of learning was to be conveyed across time and space from mentor to student. But it also came to offer a structure, the instructional strategy of presentation. The textbook was, and is, a highly ordered learning instrument; it presumes a curriculum and conserves its subjects' place therein. It creates a lesson plan or syllabus to guide both teacher and student. It offers interaction, through questions and answers, study or research assignments, suggestions for further reading and

integration of further reading with the text. And increasingly it came to offer evaluation, self-administered examinations to quizzes, to help the student find his way through the lesson. If the elements sound familiar – substance, structure, strategy, performance measures – it is because the textbook from mid-nineteenth century America to much of the world today constitutes not merely the foremost, but the solitary instructional "thing" used by most teachers. Teachers have been trained to use textbooks; they enjoy the freedom to chose or select among many optional texts; they may adapt their course work from greater to lesser conformity with the substance and arrangement of a given text; and, critically, they hold the prospect of creating their own text if none exists to serve the course as they wish to teach it.

Contrast this with the circumstance facing visual (read video) courseware or textbooks: Teachers are not trained to use non-print instructional stuff. There is little organized distribution and supply of non-print material. An instructor is constrained to use the non-print material as given, if at all, and further constrained in time, place, physical circumstance, and other logistical concerns. Further, if no such material exists for his course, he is constrained by skills and cost from creating his own; it is as though each instructor who wished to write a textbook were obliged to take his ideas to the bazaar and hire a scribe to set down the text, and then never see mass reproduction of the copy, but rather other handwritten copies.

Thus, the elements which have defeated instructional television and frustrated the full visual and textual presentation of subject matter, whatever the field of study, are still with us. We have infinitely increased the speed and flexibility of text copying; from moveable type, the invention of the typewriter, the production of mass market editions of texts, and the growth of better copying devices, text and graphic presentation of subject matter have been vastly enhanced. The constraints upon the non-print media, constraints of entrepreneurship, proprietorship, originating or authoring competence, mechanisms for inexpensive reproduction, widespread distribution, and resulting economics of scale resulting in lower cost – all these still constrain lie the non-print media.

How can the creation, production, distribution, and finance of non-print instructional materials be brought into existing or new structures such as have accompanied the growth of print in service of instruction? A word about each role.

Traditionally, the university and college have been the seat of creation of textbooks, the setting in which the authors or creators were found, were institutionally at work teaching their courses thus developing the instructional formats and strategies which would result in the printed course texts. This setting was where the initial drafts of a text were tried out, were validated by first use, for subsequent widespread use elsewhere,

and no bias operated against such use but as it differed from goals and altered direction or emphasis from another's preferred rendering of the same subject matter. In the developing world, not only creation, development, and field testing, but production and distribution as well are the task of the university. In lands lacking independent entrepreneurial publishing, it is the university itself which sees its books printed and gets them distributed. In industrial countries increasingly, and in this country for nearly a century, commercial entrepreneurship has been the midwife, the vital link between institutional creation and institutional consumption of printed instruction that has performed the critical service. Our historic textbook publishers, by means first more foul, then more fair, created markets of scale and so gained the benefits of scale from larger production runs and mass distribution of the goods. Granted, their markets were preconditioned; the potential consumer could read the language of the text, and use of the text was constrained by no special requirements of equipment, power, compatibility, illumination, or what have you. And, in our time their markets have dissagregated -- the university student of today buys fewer textbooks, but many more individual books for study. The result is that the role of the commercial publisher as producer of instructional print is greater than ever.

We may, therefore, summarize the present circumstance vis-a-vis print and non-print media as follows:

1. The role of the university with regard to instructional print is that of creater, or as supplier of authors; as financier for its vast investment in opportunity and overhead costs in the development and testing of textbooks; as consumer inasmuch as it, and its institutional stores, constitute the overwhelming channel for the distribution of instructional print; and through its libraries, major consumers and conservers of instructional print, since these instructional services by their steadfast dedication to print, and their equally sturdy resolve against non-print materials, serve to assure the dominance of print in the instructional enterprise.

2. The major congruities and contrasts between print and non-print are evident throughout: In creation, a contemporary textbook may be fashioned today, just as other learning systems, by teams of specialists, subject, pedagogical, media or graphic, and evaluation specialists; but it also may be created by an individual teacher sitting down at his typewriter nights and weekends, through terms and vacations, producing his own unique textbook. We have as yet no equivalent for the video-typewriter unless it be the porta-pack; and we have scarcely begun to grow a generation of video-text authors. After two generations of universal acceptance of film entertainment and one of television, we have yet to inspirit a desire for, or offer, institutional literacy in these powerful media and equip our future teachers to

think in these languages, to devise grammar and syntax for their use, and to apply them effectively in the business of instruction.

3. Our national production of instructional print is phenomenal, both in quality and quantity. Our major college textbooks are well designed typographically, printed very well on excellent paper, and produced in mass editions at a remarkably low price. Whereas for non-print media with the exception of microforms, there is no massed technology for widespread reproduction at lower cost. Rather, iterations from a master print are unitary in cost. In non-print media production, we are someplace between Gutenberg and Caxton, and each copy of the master work is painfully, carefully, and expensively wrought.

4. In contrast to the distribution of large lowpriced editions of standard printed instructional works to markets of scale, we have no markets of scale for non-print instructional media. What the Textbook Trust accomplished in two corrupt decades in the late 19th century by creating large-scale markets has yet to be achieved through interventions by policy or funding at any governmental level. And were there institutions to be found expounding the desirability of using non-print media of a particular size, shape, or substance, there would remain the problem of utilization. We have built heroic instructional plants in the past century for higher education, but an individual classroom or library reading room looks and is now equipped much the same as it was then; the most pervasive change in our higher education instructional physical plant is possibly the shift from blackboards to greenboards.

A further contrast between the media is pedagogical acceptance. Could textbooks ever have been as distrusted, as little accepted, by faculty in the past as film or video courses produced elsewhere are to our faculty today? A faculty member will accept Samuelson's *Economics* as a Unitarian minister accepts the Revised Standard Version as a point of departure, a useful source, but with no thought that its use as a text constrains his pedagogical freedom. But when considering Miami-Dade's mathmatics course, or our M.I.T. Center for Advanced Engineering Study video course, "Calculus Revisited," the first response is apt to be cast in terms of academic freedom.

5. A last contrast is the impact of the financial scale and the institutional arrangement for meeting the cost of instructional development. Here the contrast is stark and real. In the absence of large scale for any of the reasons just cited, the heavy initial investment required by non-print courseware is a major deterrent to innovation. The development costs are great (up to $60,000/hour); the utilization costs may be even greater. I have met those who argue that formal higher education in America simply cannot afford to re-equip itself in the sense of cost of training its staff, refitting

instructional spaces, restructuring of instructional time (both that of mentor and student) so as to make the fullest utilization of both print and non-print media. The burden of greatly higher costs in both development and utilization deters the commercial publisher entrepreneur and leaves the university no longer just prime creator and consumer of these instructional materials but publisher as well. Having been conditioned by experience and tradition to accept merchandizing investments only in pre-tested instructional stuff for markets of sufficient scale, the traditional college textbook publisher finds it hard to move non-traditionally into the full acceptance of what in the past has been society's contribution to extending his product line.

FORCES FOR CHANGE

In this unappeasing climate, in the face of the changing (and economic threatened role of the faculty, in the prospect of slow growth of visual literacy and competence, and in the easing of institutional regidities against the use of non-print media, but of somewhat great flexibility in schedule, pace, and locale of instruction, what difference, if any, can be accomplished through instructional adoption of cable television?

The answer today most certainly is little, if adoption is not accompanied by, or part of, other changes or reform of traditional post-secondary instruction. With reform or with new markets largely to be served outside of campus-based instruction, the prospects are better. These prospects we have heard about these past days: extended delivery, cheap transmission, instructional variety, economies of scale, particularly in long-haul delivery. We have heard also of requisite institutional adjustments in the management of instructional resources that might favor or enhance the usefulness of better delivery mechanisms. Our universities are much more than aggregations of faculties and students. Over time, university services, like those of other long-established bureaucracies such as the church and the military, have sprung into being to serve their particular clientele. Major universities such as those represented here have departments managing their portfolios, their telephones, their real estate; and their services which might be directed into support of their instructional program would include their libraries, their university presses, their computation centers, their radio and television services, their offices of tests and university examiners, their centers of research in learning and teaching. Of these services, some have from the first been clearly dedicated to support of instruction. But from the support of traditional instruction, they may now need redirection toward support of less traditional instruction. And others most notably, the university's press and its radio and television services, scarcely relate their existing mission and presence

to instruction at all. Let us consider the present and potential role of several university services in a more fully mediated instructional effort.

The library rests at the center of print-mediated learning. Insofar as the great university libraries serve principally the research interests, of their universities, their traditional preoccupation with print, as in the devotion of university museums to artifacts, is still central to their mission. But in a library geared to serve instruction, how can one justify the near total dominance of print, or more correctly, the literal forebearance from non-print? The rationalization most frequently heard in response to the charge is that libraries buy and circulate those instructional things that instructors want and specify. But we all know the latitude, indeed the obligation, under which our university libraries have built their collections in the past World War II decades. They, not the instructional staff, have taken the initiatives, have initiated the service mechanisms, have pioneered the innovations in using print in new forms and ways. Why then have they so neglected the visual complement to print?

Two reasonable adjustments to current instructional library practice are offered as essential to the creation of a better or more favorable instructional environment. First, let library acquisitions budgets be examined in the context of university-wide instructional goals and the tools and instruments that are obligated by those goals. And second, let the rich experience of university libraries, particularly in the useful form of instructional production they know well, the production of microforms, be geared into the university program for creation of non-traditional materials of instruction.

The university press is peculiarly American in its historic commitment to research scholarship, rather than managing the creation, production, and distribution of the tools of instruction. Among others, I have analyzed this delimiting of the potential area of service and concluded that it was all the result of the Textbook Trust. If the Trust had never succeeded in creating markets of scale for textbooks, then commercial publication of most university-created print would have resulted in this country as it did the world over. But concentration on an instructional product to serve solely the markets of scale left the American textbook industry very cool to the prospect of publishing the thousands of doctoral dissertations, publication that was a requirement for the Ph.D. degree until World War II. So long as the degree obligated the candidate to publish, there had to be a publishing capability, and finding none among the commercial publishing sector, American universities created their own. A massive redirection of the resources and skills of existing American university presses into instructional channels, a reallocation of university resources invested in the development of these presses, is a high priority for contemporary universities to consider. For no instructional systems yet designed have greatly diminished the role of print, and where does a

university more appropriately find revelant skills for development of innovational instructional print than in the university's own publisher?

Moreover, the university press is a gathering place for skills highly useful to the creation, development, and marketing of non-print materials, though the production technologies differ. Editorial procedures would well serve the tight scripting of instructional systems and components, design and production; the planning of publication methodologically is very much akin to the development of other learning products. And the marketing of goods and services created by a university is unmistakably better managed by a university press than by any other marketing entity around – including the universities' admissions office – and infinitely better than the experience I have observed in the marketing by centers, institutes, or departments themselves of non-print media. This is not to argue that non-print marketing ought to be done solely by university-based capabilities, but that adaptation or change in the existing structure or capability of the university press would serve well the marketing of innovational non-print.

There is considerable gain in examining current trends in the structural arrangement and management of university computing services. Originally serving research, they tended, like portapacks, to proliferate, and organizational response first was to centralize their administration. Under such arrangement, instructional usage came last.

Now a computer generation has passed, and the single structure is being divided between (a) operations, or maintaining the integrity of the system, and (b) user services or doing interesting things with the capability, particularly instructional things.

One computation seer, Arthur Luehrman, Director of Project COMPUTe, Dartmouth College looking further down the pike, foresees the potential disappearance of operations per se as a university computing responsibility as shared usage and computer networking grows, and foresees a major rededication of campus computing direction and manpower to exploring needs, designing responses, and providing assistance to instructional and research (note the order) deliveries.

There was a time when one spoke of educational broadcasting. Not being a chartered member of the club, I salute those hardy pioneers who stayed with their mission and are still today directing the instructional broadcasting services of their universities. But what once was a university-based educational broadcasting capability of some dimension became, more than the name change suggests, public broadcasting; and as one midwestern academic vice president told, "We found that our broadcasting service was 90% public and 10% education." He added, "We intend to invert the ratio." It is no criticism of public broadcasting to agree that instructional television and public broadcasting never synonymous, have diverged in mission and programming since public

broadcasting came to be. The overwhelming fraction of federal investment in educational technology goes to upgrade and improve our national educational broadcasting plant; yet the utilization of that plant is overwhelmingly for entertainment, albeit, for most of us here the only entertainment broadcasting that we enjoy. It is for the policy makers to determine to what extent and how far public broadcast should enjoy national television coverage through additional and improved plant. But is surely the prerogative for each university which numbers among its myriad services a radio or television facility, and which annually supports that service with staff and power and programming development, to ask that appropriate fraction of program time be dedicated for its instructional use.

Last, some services, though available commercially, have grown up on our campuses not for reasons of cost but convenience. Most evident, and least noted among these, are the entities variously labelled graphic services, or university printing, or official publications, or audio-visual services; by whatever the name, these departments supply the grease that makes the instructional engine run. From the departmental mimeograph machines to the monopolized institutional copying franchises, from the making of slides and transparencies to the preparation of film strips and maps – these constitute the enfranchised, but customarily remote, instructional support services absolutely requisite to more fully mediated instruction. Characteristically, these services, prior to the advent of xerography, operated with some university subsidy, and some, depending upon their copy-center pricing formulas, may still. But they have always been seated below the salt, as have their fellow mediators, the publishers, the broadcasters, at the instructional development table. The practitioners are hard working, responsive, unendingly anxious to cooperate, yet accursed; it has been their lot to serve instructional technology as traditional instruction would have it, on call, rushing a projector or receiver to the classroom, at an institutionally determined cost unvaryingly judged high by their instructional contractors.

These university resources – services created, supported, and sustained by the university – these instructionally related services are to my awareness nowhere integrated as equal partners in the enterprise of preparing instructional programming for their institutions. Each serves its institution in its chosen or traditional ways. Occasionally, organizational restructuring functionally unites some services in the form of a media center or consolidates some responsibilities in the form of a new administrative office or officer. Although improvements, they will not save the patient. To mediate their instruction more fully, universities will have to structure and mobilize their full instructional resources – faculty, students, libraries, print and microform publishers, broadcasters, design, audio-visual, xerographic professional capabilities – in an integrated purposeful way.

WHAT HAS ONE PUBLISHER OF LAST RESORT LEARNED ABOUT VIDEOPUBLISHING?

The Center for Advanced Engineering Study at M.I.T. is not a think tank, but is dedicated to continuing mid-career education of engineers. For those of you, like myself, who are humanists, you must understand that engineers, like Detroit automobiles, depreciate rapidly in value as technology changes. They enjoy a short-lived bloom, entering the job market at 50 to 70% of their highest annual wage, and without refurbishing, find themselves without appropriate skills for lateral assignment 10 years after graduation.

The Center chose to create courses not for specific credit, graduate or otherwise, but service courses designed to provide or refurbish essential skills, in math, process engineering, and such areas.

M.I.T. is so far as we know, the only university in America which operates a fully functioning instructional videopublishing program. It creates its courses, produces the print and visual components, warehouses its unsold stock, undertakes to market its courses nationally, and enjoys some partial success in the enterprise. Our CAES self-study program offers a dozen courses of varying length, and has eight more between storyboards and the can. We will sell, rent, or otherwise gain revenues of more than two hundred thousand dollars on our product this year. Let me make a few generalizations about our experiences, organizing my comments along the functions of publishing: editing, production, marketing, business financial, and warehousing and distribution.

Editorial: Our principal authors are faculty members working in conjunction with a film or video producer, a studio production team, sometimes a research or teaching assistant, and that's it. There is a collaborating crew, but we have not yet evolved the ideal four-man team (famed in theory and embraced by the Open University) of a subject specialist, a pedagogical specialist, a media specialist, and an evaluator all working synergetically in the design and creation of courses. Our faculty members fill substantive, pedagogical, and evaluative roles. They also write the study guides, and though we augment their capabilities, their traditional roles in design and creation are largely conservative. We pay them royalties for their labor and their creative endeavor by buying released teaching time from the Institute. Our own return comes from our successful marketing of his work. In short, our "author-publisher" arrangement has evolved from a pragmatism born of a mixture of economic and professional constraints.

Production: We have helped ourselves, as videopublishers, by a high investment in equipment and skills for our video components, and perhaps hurt ourselves by formats too rigid, by shooting too many standup lectures and talking heads. A videopublisher uses a lot of print. Our video and film

materials have a top standard of broadcast quality. Our print materials are more informal, not in substance, but in makeup and style of product. We produce study guides so instructionally helpful that one of our two university customers (Dean Tom Martin of SMU) called them our most valuable instructional product. But they are short-run publications, so we type masters, print offset, and try to sell them as inexpensively as possible. We use a standard text book whenever possible, and only when none can possibly serve, do we resort to creating a new one. Even then, that text is published commercially or by our M.I.T. Press. Our production staff is tiny and is responsible for both text and visual components. Our major production dilemma is the video-to-film conversion—most of our customers want our courses in 16mm finished film. An offset master produces a thousand copies of a text page in minutes, and at a low marginal cost. But neither film nor video can be printed – that is, be reproduced in quantity rapidly, nor does the cost decline as with printing linearly with length of run or number of copies.

Marketing: Constant national marketing is essential: In spite of seven years of beating the drum, very few institutions and businesses know our courses. This is because a serious review of a highly mediated instructional system is expensive, time-consuming, and very hard work. There are no other reviewing mechanisms. There are no shareable exhibits for small publishers at the meetings we should attend, and individual exhibiting is prohibitory in expense. There is last the problem of transferability – M.I.T., all in all, enjoys a good reputation, enough so to attract very good students. Nonetheless, until Dean Lionel Baldwin had the courage in 1972-3 to install our calculus course alongside his own live, and his videotaped, Colorado State calculus course, and test our course against his course, no university had so much as tried it, and only a handful had asked for the preview package. Previewing a video course is hard. A textbook gets sent free to a potential adoptor. He examines the book at his leisure, usually at home, then, if he likes it, asks the university store to order it for his class. Videopublishing entails a marketing effort that must anticipate hardship in preview or evaluation, must overcome enormous inertia in adoption, and requires substantial physical and logistic management in use.

Business and financial: The front-end costs of this kind of publishing are large and ours have been sizable, larger because of our resolve to offer broadcast quality. In roundest terms, our total investment covering building, equipment, and skills, to date for twelve courses is close to one and one-half million dollars and, as you heard, we will in our sixth selling year, move 20% of that in sales. No commercial enterprises could or would operate this way. Ours is a prototypical effort, an experiment in instructional production and delivery, and as such, what we learn benefits the total community of American higher education. In the best sense, society is subsidizing us to undertake this experiment, in the Sloan

Foundation and U.S. Office of Education that set us up, in the support of M.I.T. by private and business philanthropy, and in publicizing our work at meetings such as this. But early losses are to be expected where product development must be pioneered and institutions must be rearranged before the product can be marketed. We will never fully regain our development investment, but we aim to achieve a steady state of sales income and operating expense including cost of new product development. Our courses are not budgeted as high cost–instead of $10,000 – $60,000 per finished instructional hour of much instructional television, we are spending $3000 per instructional hour. And the true cost to the customer is, of course, determined by the number of users.

Warehousing and distribution: This traditional publishing concern is not, for a publisher of our scale, unduly burdensome. Film and video are bulky and have special storage requirements, but these aren't serious. Moreover, the miracle of the postal system, which serves us very well most frequently, and on one occasion, shamefully, takes care of our distribution. However, we are marketing nationally an instructional product limited in its service capability–we cannot bicycle live instruction around the country as the US mails do our tapes and print. Personally, I would hope that one or both of the domestic satellites add a dedicated educational transponder gambling that if it exists, places such as M.I.T. will have a use for some fraction of the transmission year. M.I.T. has followed slowly along the path of our colleagues at Stanford, Colorado State, SMU, Penn., and a dozen others which are by now well versed in live instruction via broadband. We have not used Instructional Television Fixed Service, remote classrooms, or other wired or broadcast transmission of live or recorded instruction. But granted our valued courses and an accessible national broadband communications network, we would offer live or recorded instruction in whatever mode to support our courseware.

WHAT TO DO?

For the forseeable future, your universities will be obliged to become publishers for non-print media. They will be so obliged because the markets, where visible, are small and fragmented, and too risky for commercial enterpreneurship. Thus, for much the same reason as they created their own university presses and broadcast services and graphic services, universities will integrate these capabilities with instructional faculties and staff and create, distribute and consume own instructional non-print programming.

Moreover, since the production costs are high, institutional sharing is in order, and is happening. Jack McBride's Mid-American University plan is one such regional conception. M.I.T., Colorado State, and SMU have begun an examination of what sharing might mean for the realm of

continuing engineering education. Universities do not share gracefully, it has been pointed out, but the models of the major curriculum revisions of last decade and the regional laboratories – two experiments serving public elementary and high school education – offer guidance, both positive and negative.

The first act of the university as videopublisher is to get its instructional house in order, to integrate its instructional resources, and use them effectively for its own purposes.

The second act is to find partners for an enterprise which inevitably will be long-term and expensive.

The third is to identify useful collaborators in the nonuniversity world. These begin with industry, which has had the courage to test non-print instructional tools and make them succeed. To industry, I would add the military, which has the unenviable task of processing 400,000 students a year through programs where failure cannot occur. And last, by their scale, but full of pride for their hardiness (Or should I say foolhardiness?) those pioneer/commercial publishers of video courseware who share our present concern and risks, for theirs is the solitary marketing experience we can trust.

With effective use of existing instructional resources, with lots of mission sharing with other universities, and with the help of those we have not always treated as friends, higher education can produce video programming of merit for this evolutionary period; universities will gain additional markets; cable television will gain a new product; and the burden of being publisher of last resort may prove to have been a blessing for all concerned.

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